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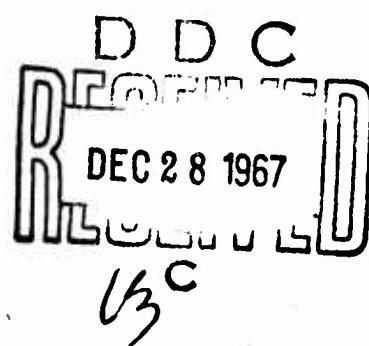
CRASH INJURY BULLETIN

PART I ATTACHMENT OF SEAT BELTS IN THE HU-1A HELICOPTER

PART II STOWAGE OF EQUIPMENT UNDER TROOP SEATS

September 1960

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AVIATION CRASH INJURY RESEARCH

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CRASH INJURY BULLETIN, PART I, ATTACHMENT OF
SEAT BELTS IN THE HU-1A HELICOPTER, PART II
STOWAGE OF EQUIPMENT UNDER TROOP SEATS.

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Aviation Safety Engineering and Research
Phoenix, Arizona

November 1960

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CRASH INJURY BULLETIN

AvCIR 69-0-120

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By

Harold F. Roegner

FOR

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Transportation Research Command

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PART I

ATTACHMENT OF SEAT BELTS IN THE HU-1A HELICOPTER

The photographs on page 2 (Figures 1 and 2) depict the correct and the incorrect manner of attaching the safety belts in the HU-1A helicopter. The most desirable installation is illustrated in Figure 1.

To fully utilize the skeletal strength of the human body, the seat belt should pass across the hips at approximately 45° to the longitudinal axis of the airplane as illustrated in Figure 1. When restrained by a seat belt only, which is common in the cabin area, the occupant's body will flex over the seat belt during a forward deceleration. If this flexing of the body occurs at the lumbo-sacral joint, the strain on the spine will be minimal.

When the safety belt is attached to the "O" ring, (Figure 2) the spine is forced to bend or flex at a much higher level which often causes flexion fractures of the spine.

The incorrect belt installation permits the safety belt to "ride up" and could cause rib and/or chest injuries due to flexing over the belt buckle, in addition to possible spinal injuries.

The medical report from a recent accident in which the safety belts were attached to the "O" ring states that the injuries sustained by this occupant were:

PART I

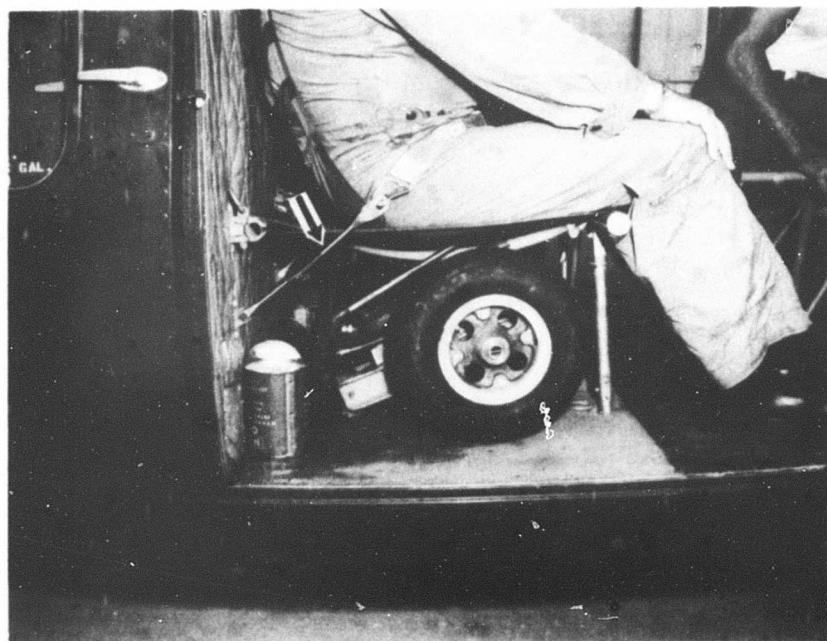


Figure 1. The correct manner in which the safety belt should be installed in the HU-1A is depicted by the arrow. Note that the belt crosses the hips at approximately 45° .

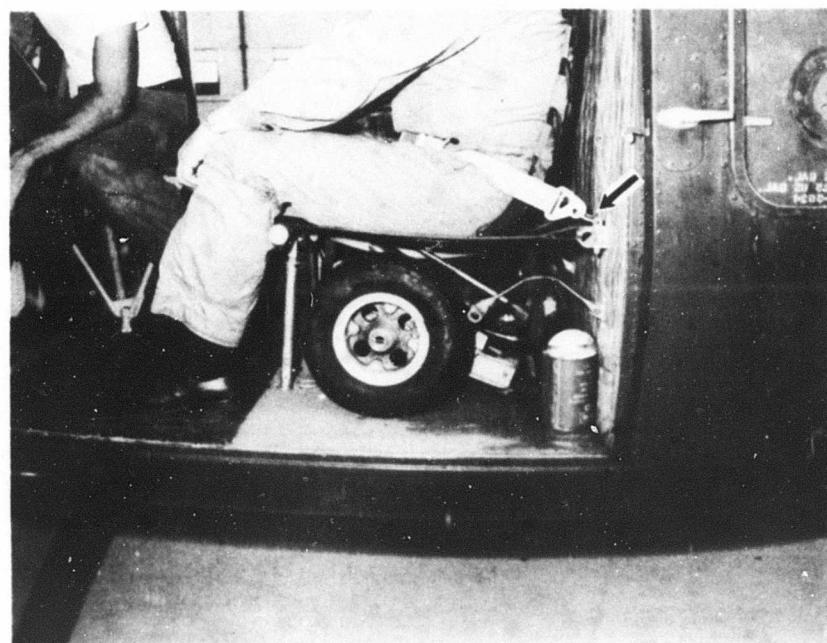


Figure 2. The incorrect method of attaching the safety belt to the "O" ring is depicted by the arrow. Note that the belt crosses the occupant at approximately 90° .

PART I

"A red streak across the chest, tenderness to the lower rib cage, tenderness in the lumbar spine area, and contusion right buttock. Decreased breath sounds at right inferior - anterior chest. Microscopic hematuria. X-ray revealed hazy density lower left lung field with sharply defined borders - may be fluid or contusion. This cleared somewhat by two days post accident."

The attending doctor stated that he felt the injuries to the chest, lower rib cage, and lumbar spine were due to the safety belt not being properly positioned over the hips. This statement was substantiated during an interview with the occupant, during which he stated the safety belt kept "sliding up".

Attachment of the safety belts to the cables as illustrated in Figure 1 reduces the possibility of spinal or internal injuries to the occupants involved; reduces the possibility of rear longitudinal seat support failures; and provides for greater restraint for the occupant since these cables are anchored to primary structure.

Based on the foregoing, it is recommended that a bulletin be issued, specifying that the proper attachment (cables) be used for the safety belts in the cabin of the HU-1A.

PART II

STOWAGE OF EQUIPMENT UNDER TROOP SEATS

Figures 3 and 4 illustrate the area under the seat which is used as a "catch all" for the ground handling wheels, oil cans, tool boxes, main rotor tie-down, litter attachments, and other loose equipment carried in the aircraft. These photos were taken of an aircraft selected at random.

Accident experience with the type troop seat utilized in this aircraft indicates the seat will fail under even moderate crash load conditions. It is, therefore, important that the area directly beneath all occupied troop seats be kept free of loose equipment such as illustrated in Figures 3 and 4.

Figure 5 depicts an accident showing the wheels stowed beneath the seats. The occupant of this seat sustained painful buttock injuries and tenderness in the lumbar spine area as a result of bottoming out and striking the ground handling wheels with sufficient force to break the castings (arrow - Figure 6) at the top of the wheel assembly.

Based on the foregoing, it is recommended that a bulletin be issued specifying that the area beneath all occupied troop seats be kept free of loose equipment. Further, if equipment has to be carried under unoccupied troop seats, it should be of a non-rigid type and securely anchored to prevent it from becoming a missile in the event of a forward deceleration.

PART II

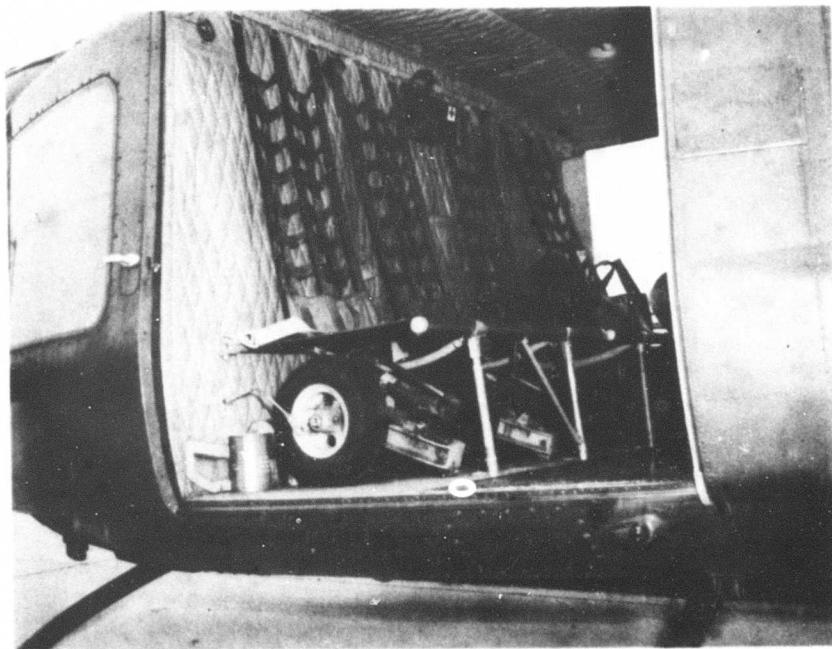


Figure 3. Over-all view depicting the large assortment of items placed beneath the seat.

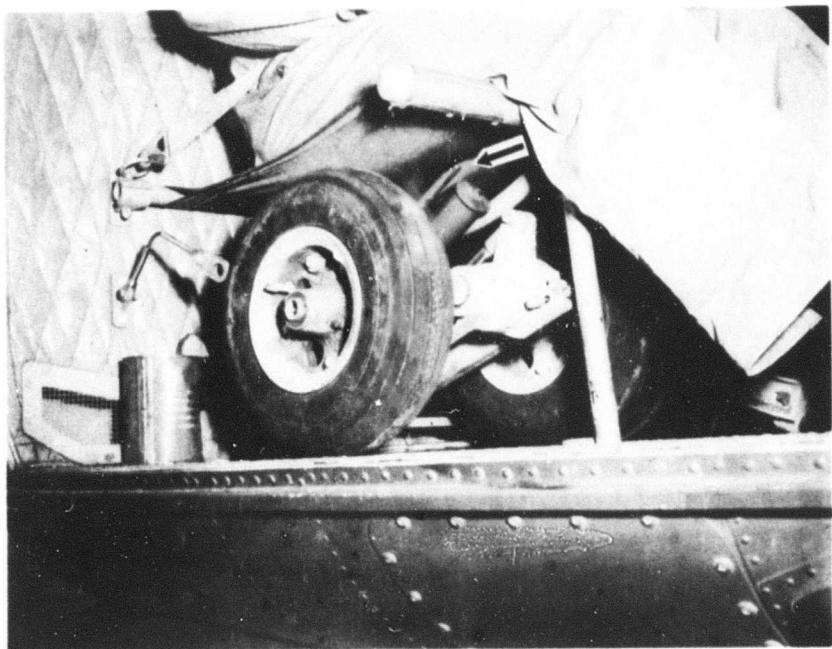


Figure 4. Close-up of the ground handling wheels stored beneath the seat. Note the position of the hand pump lever (arrow).

PART II

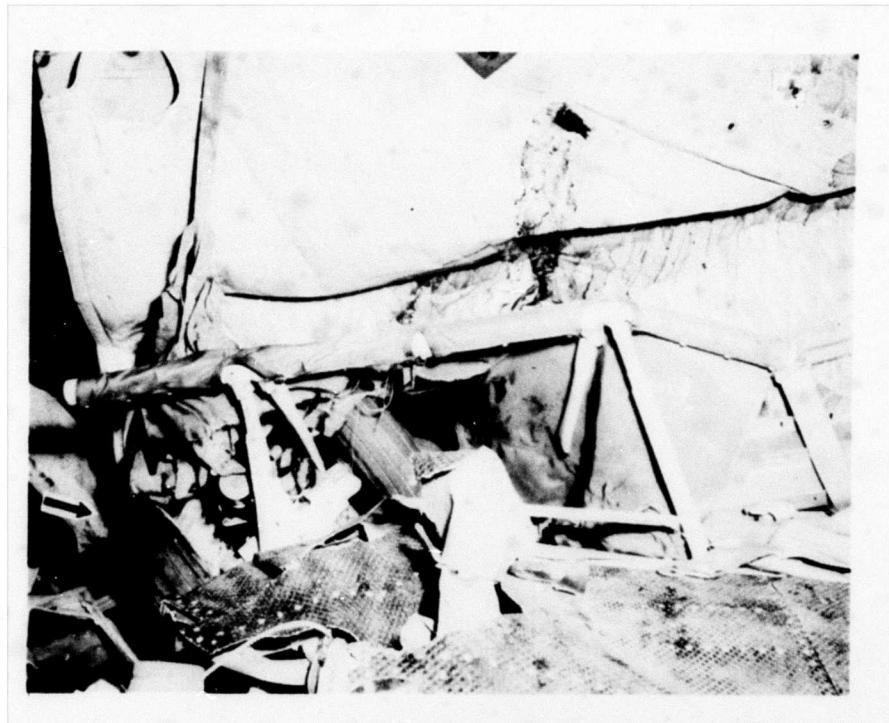


Figure 5. The wheels stowed beneath the seat (arrow) were a prime contributor of the injuries sustained by this occupant.

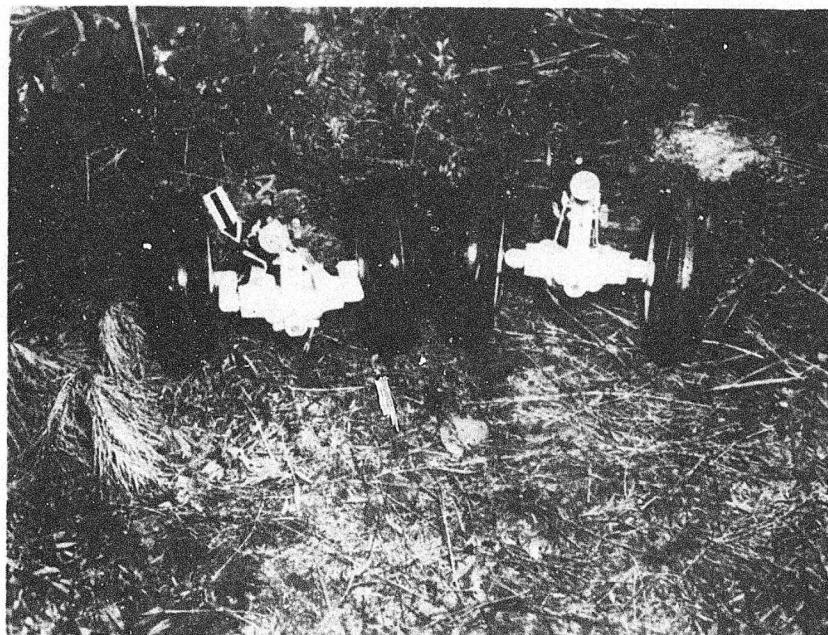


Figure 6. The arrow depicts the broken casting on the ground handling wheels. Note the amount of downward deflection as opposed to the intact set on the right.